

A NOTE ON THE OCEANIC SPECIES OF MELICYTUS (VIOLACEAE)

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THE GENERA *Melicytus* Forster and *Hymenanthera* R. Br. together comprise 13 species of shrubby violets with nearly actinomorphic flowers. The genera have been distinguished primarily by the number of seeds per carpel, but Beuzenberg (1961) has shown that this character varies both within and between species in such a way that the distinction between the two genera cannot be maintained. Furthermore, two species, *Melicytus lanceolatus* Hooker f. and *Hymenanthera chathamica* (F. Mueller) Kirk, produced a fully fertile hybrid, suggesting that there are no consistent breeding barriers between the genera. Although Beuzenberg suggested that species of *Hymenanthera* be included in *Melicytus*, he did not publish the relevant combinations. In this paper we will use the name *Melicytus* to refer to all members of *Melicytus sensu stricto* plus *Hymenanthera*, whether or not the combinations have been formally made.

Most species of *Melicytus* occur in New Zealand or Australia, but there are also representatives on the Kermadec Islands, Samoa, Tonga, Vanuatu, Norfolk Island, Lord Howe Island, Chatham Island, the southern Solomon Islands, and Fiji. This paper will consider the status of three oceanic taxa, *M. ramiflorus* J. R. & G. Forster subsp. *oblongifolius* (Cunn.) P. Green, *M. fasciger* Gillespie, and *M. samoensis* (Christoph.) A. C. Smith, in their relationship to each other and to *M. ramiflorus* subsp. *ramiflorus*, from New Zealand.

Since Beuzenberg's 1961 publication, the genus has received little attention. Jacobs (1966) and Jacobs and Moore (1971) mistook a specimen of *Melicytus fasciger* (Kajewski 841) from Vanuatu for *Rinorea bengalensis* (Wallich) Kuntze. In 1975 Van Steenis reported a specimen of *M. fasciger* (Whitmore BSIP 1695) from the Santa Cruz group of the Solomon Islands. In 1970 Green transferred the New Caledonian species *Hymenanthera latifolia* Endlicher to *Melicytus*, and in the same publication he reduced the Fijian *M. fasciger*, the Samoan *M. samoensis*, and the Norfolk Island *H. oblongifolia* Cunn. to subspecies of the New Zealand species, *M. ramiflorus*. He gave little evidence for reducing the oceanic species to subspecific status. He was countered in 1978 and 1981 by Smith, who claimed that *M. fasciger* and *M. samoensis* were sufficiently distinct from *M. ramiflorus* to warrant specific recognition. Smith distinguished the three species on the bases of leaf serration (conspicuously serrate, subentire to crenulate or serrate, or subentire to callose-crenulate), number of serrations per cm (3 to 5 or 4 to 7), and petal length (2 mm or less, 3–4 mm, or 4–7 mm). Smith expressed no opinion on the status of *M. ramiflorus* subsp. *oblongifolius* (Cunn.) P. Green.

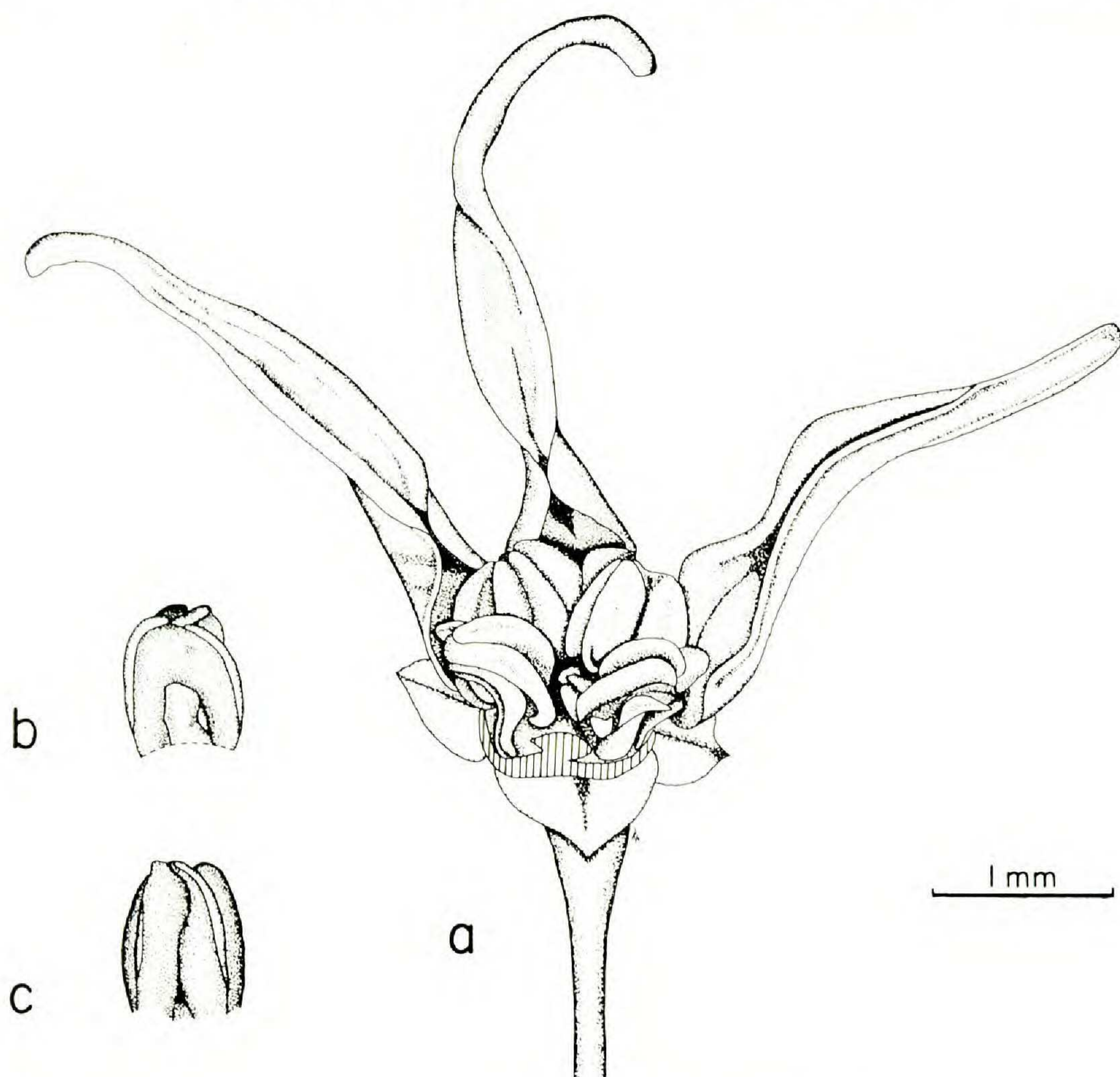


FIGURE 1. *Melicytus fasciger* (Stauffer & Koroiveibau 5827): a, flower with 1 stamen and 2 petals removed; b, stamen, abaxial side, note flaplike connective; c, stamen, adaxial side (stamens of other 3 species virtually identical).

CHARACTERS STUDIED AND THEIR DISTRIBUTIONS

We examined material of *Melicytus fasciger*, *M. ramiflorus* subspecies *oblongifolius* and *ramiflorus*, and *M. samoensis* collected throughout their ranges. All four are small trees with membranaceous, elliptic to ovate or obovate, glandular-toothed to subentire leaves. Stipules are triangular to lanceolate and caducous. Leaf scars show little variation in shape; there are always three vascular bundles. Leaf-venation pattern is similar throughout the genus: pinnate and eucamptodromous, with the free endings of veinlets generally single but sometimes branched. Flowers are in axillary fascicles with pedicels 3–12 mm long that appear to elongate soon after anthesis in the pistillate plants. Petals and sepals are inserted at the edge of a somewhat expanded receptacle (see FIGURES 1 and 2 for comparison of flowers of *M. fasciger*, a member of the study group, and *M. lanceolatus*, typical of the rest of the genus). The stamens, surprisingly uniform in these species, are free and have only a small appendage on the dorsal side (generally no more than half the length of the anther); the anthers are sessile or nearly so.

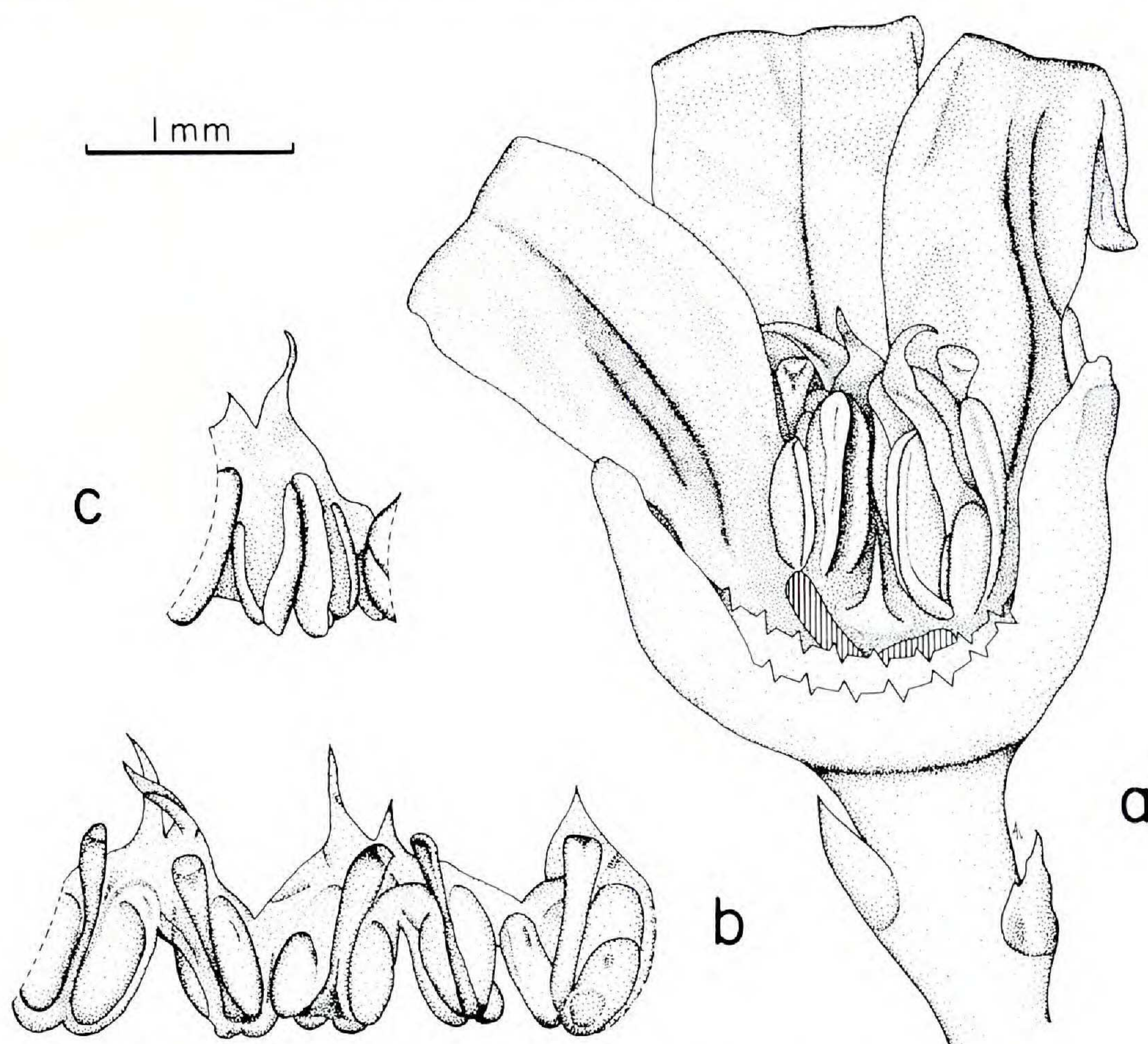


FIGURE 2. *Melicytus lanceolatus* (Kirk s.n., A): a, flower with 1 stamen and 2 petals removed; b, stamen, abaxial side, note extended connective; c, stamen, adaxial side.

In an attempt to find discrete, concordant differences among the species, we began by testing the characters that Smith had used, particularly leaf serrations and petal length. We counted the number of teeth per centimeter and per side of the leaf for five to ten leaves on each of 136 specimens. These data are displayed in FIGURES 3 and 4. There are clearly no breaks in the distribution of either character. Describing the leaf margins as serrate, subentire, or crenulate also requires subjective division of a continuum. Although certain tendencies are observable in some groups of specimens, they are insufficient to allow consistent distinction among groups.

Stipules are generally glabrous, except in the New Zealand members of *Melicytus ramiflorus*, in which they are covered with stiff pubescence (as are the bud scales, and the pedicels and calyxes of pistillate flowers). Pubescence is present on all specimens of New Zealand *M. ramiflorus* examined, but it is absent from the Kermadec Islands specimens and from all other members of the genus, including the specimens from the Oceanian¹ islands.

We measured petal length on 49 specimens; pistillate flowers were measured if they were open, whereas staminate flowers were measured only if they were

¹As used here, Oceania does not include New Zealand or Australia.

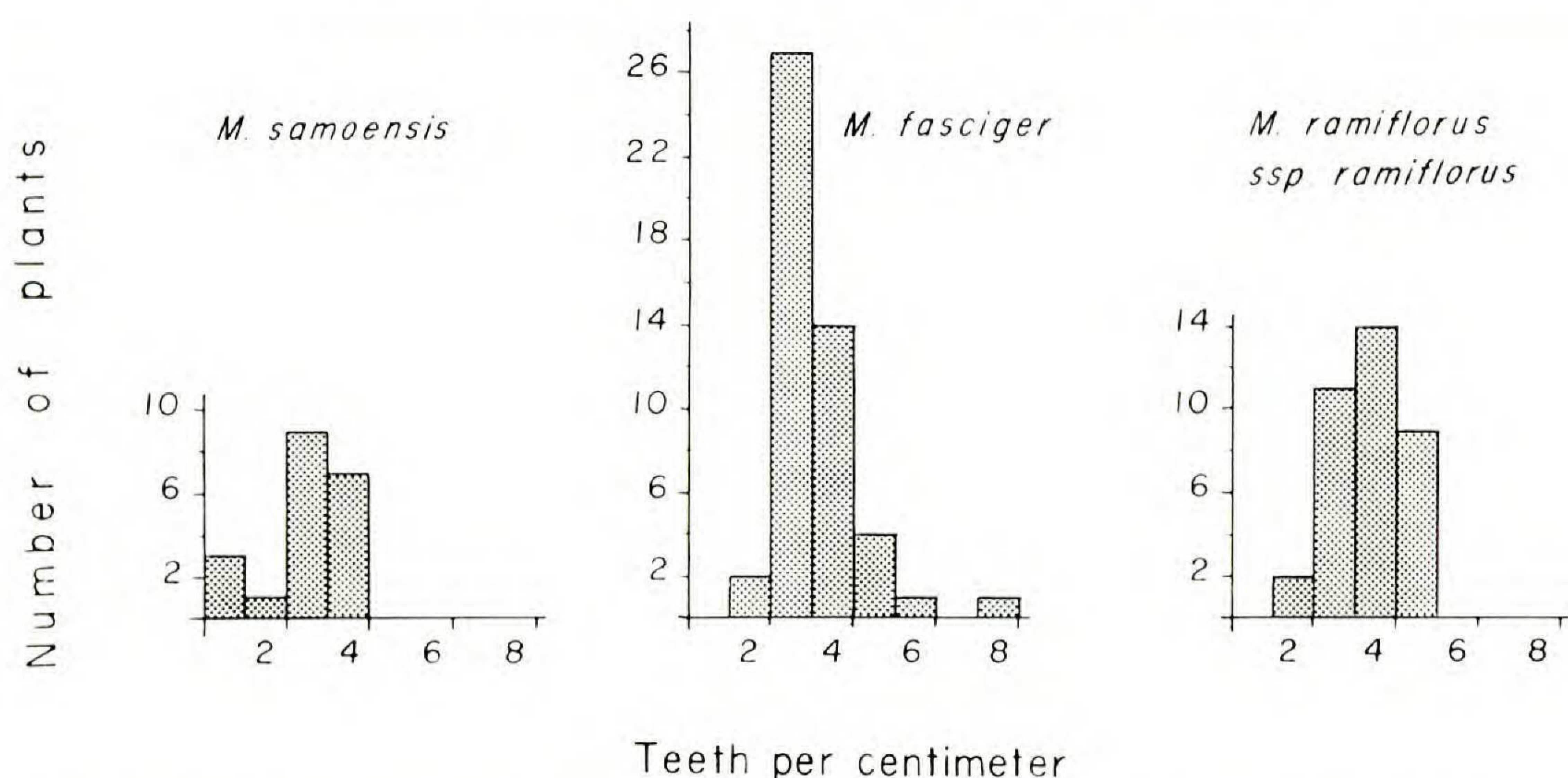


FIGURE 3. Leaf margins: number of teeth per centimeter of margin. Each graphed value = median of counts on 10 leaves per specimen. (*Melicytus ramiflorus* subsp. *oblongifolius* (obscurely crenate rather than dentate) not illustrated.)

past anthesis. (Smith (1978) noted that petals elongate rapidly prior to anthesis.) The measurements are graphed in FIGURE 5. Several conclusions are possible from these graphs. First, pistillate flowers appear to have smaller petals than staminate ones. Second, there is no break at 2 mm, as was suggested by Smith (1978); New Zealand and Oceanian specimens can therefore not be distinguished on the basis of this character. Third, there is a conspicuous break between 3.5 and 4.8 mm for the Fijian plants. The plants with very long petals are all staminate ones collected from Viti Levu (Fiji), but there are short-petaled specimens from that island as well (discussed in more detail below). Petal shape varies from short and rounded to more or less triangular to long and lanceolate, with the shape correlating roughly with the length; however, the variation is not consistently correlated with any other characters that we have been able to find, nor can it be divided into discrete character states.

Each flower is generally subtended by two bracteoles, but the position of these varies. They may be directly under the calyx, as in the long-petaled specimens from Fiji; about midway on the pedicel, as in *Melicytus ramiflorus*; at the base of the pedicel and indistinguishable from the bracts, as in the specimens from Samoa and Tonga; or variable in position, as in plants from Norfolk Island. Bracteole shape varies little. Pedicel length varies somewhat, but because elongation appears to occur soon after anthesis in the pistillate plants, this was a difficult character to use.

The fruit is a berry with several seeds. Seeds are of two distinct types: small (less than 3 mm long) and purplish black, or large (greater than 3.5 mm) and tan. The small, dark seeds are found in both subspecies of *Melicytus ramiflorus*, while the larger, tan ones occur throughout the genus, including *M. fasciger* and *M. samoensis*. Curiously, the large seeds are rarely filled with endosperm, whereas the smaller ones are nearly always filled with a white oily endosperm. The seeds of the Samoan specimens are substantially larger (all over 4 mm) than those of any other group of specimens, whereas the seeds of the other

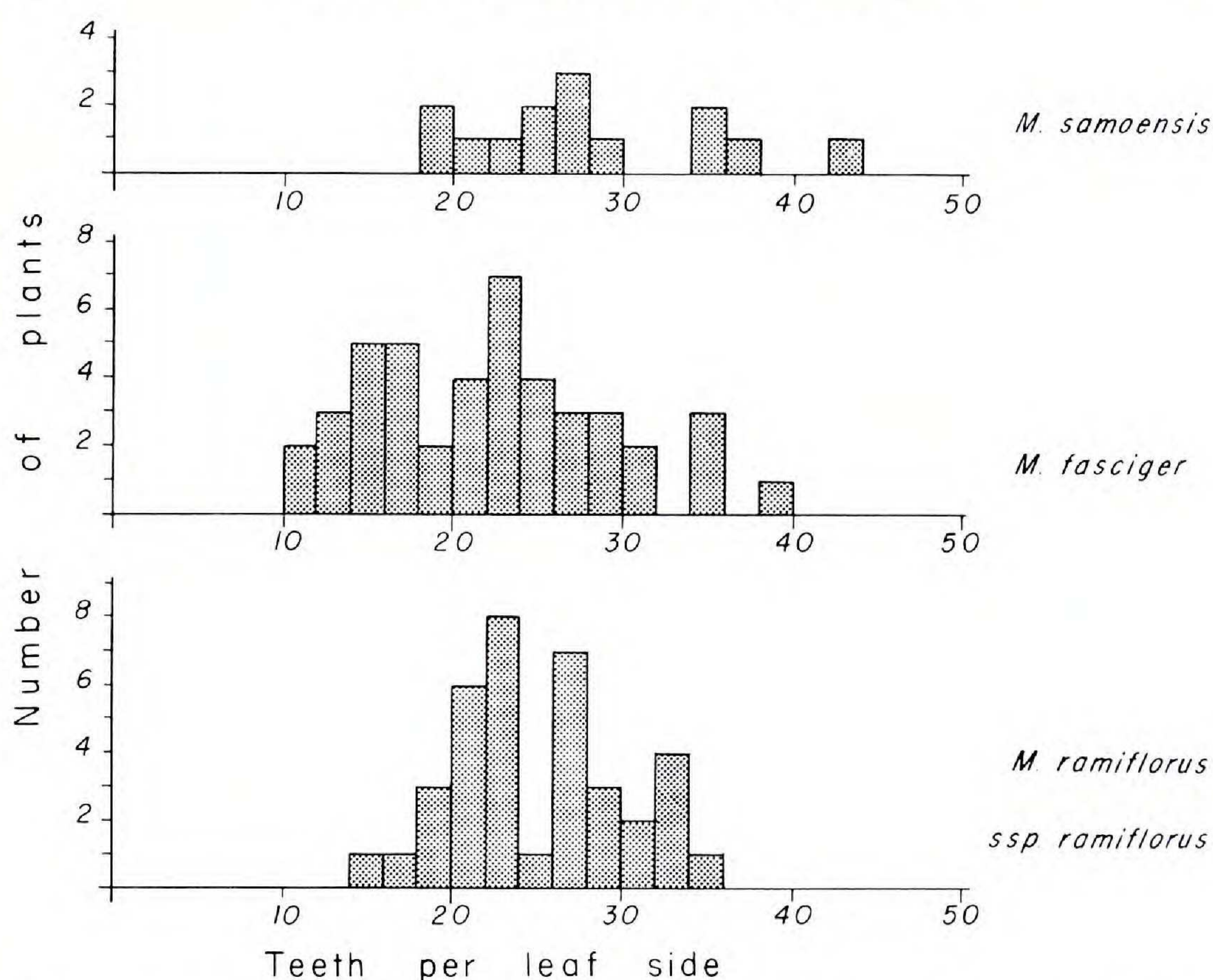


FIGURE 4. Leaf margins: number of teeth per side of leaf. See explanation under FIGURE 3.

Oceanian plants are intermediate in size between those of *M. samoensis* and those of *M. ramiflorus*.

The two basic seed types also have distinctive testa structures. The small seeds (FIGURE 6A) have a double or triple outer layer of large, open, irregular, thin-walled cells containing irregular bodies of dark-staining material that may be tannins; inside this tissue is a single or double layer of thick-walled lignified cells with prominent plasmodesmata. The innermost layer of cells is again thin walled and small. In these seeds a vascular bundle with a sclerenchymatous sheath is always visible at the chalazal end. The large seeds (FIGURE 6B) have a thin outer layer of more or less collapsed and indistinct cells around a single or double layer of thick-walled cells similar to those in the small seeds. Although some vascular tissue is apparent in the funicular region of these seeds, it is never surrounded by a sclerenchymatous sheath. In specimens of *Melicytus fasciger* and *M. samoensis*, there is considerable variation in the thickness of the various cell layers in the testa, but there are too few specimens available to determine whether this is due to the age of the seed or to variation within a plant, or whether it might delimit taxonomic groups.

DISCUSSION AND CONCLUSIONS

The data suggest that *Melicytus ramiflorus* from New Zealand can be distinguished from the Oceanian members of the genus by 1) stiffly pubescent

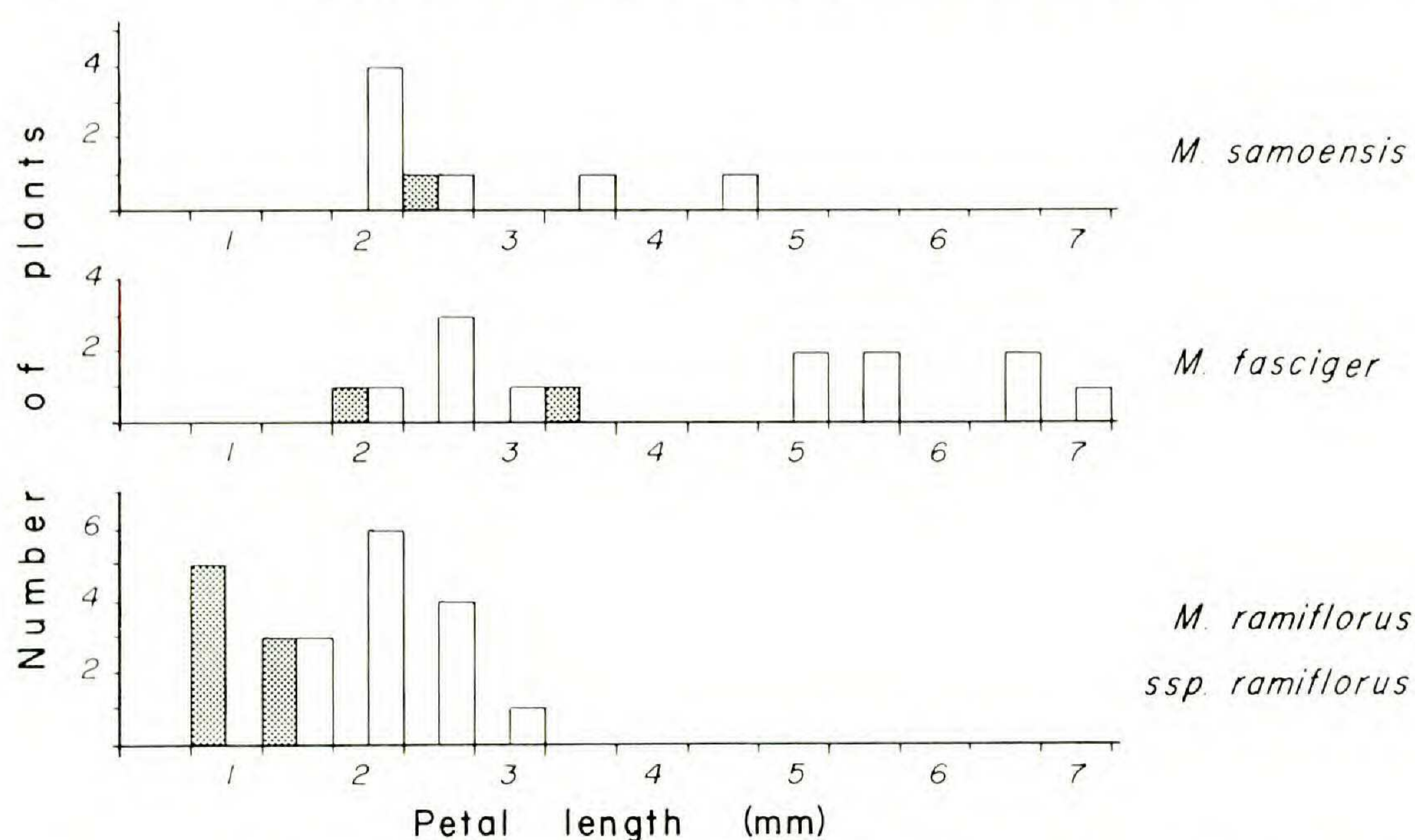


FIGURE 5. Petal length. Shaded bars = pistillate flowers (measured if open); open bars = staminate flowers (measured after anthesis). Flowers measured after rehydration. Each graphed value based on mean of 5 flowers per specimen, 5 petals per flower. Single flowering specimen seen of *Melicytus ramiflorus* subsp. *oblongifolius* was staminate, with petals 1.1–1.2 mm.

stipules and bud scales on all plants, and puberulent pedicels and sepals on pistillate ones; 2) bracteoles about midway along the pedicel; 3) seeds less than 2.5 mm long; and 4) testa dark, minutely and irregularly tuberculate, with a distinctive structure in cross section. Of these characters, numbers 1 and 3 appear to be unique in the genus, while 4 is shared only with *M. ramiflorus* subsp. *oblongifolius*, from Norfolk Island. The seed characters also appear in *Sykes 643* (L), from the Kermadec Islands, but the stipules on this plant are nearly glabrous. We conclude that the testa morphology serves as a unique character to unite the New Zealand, Kermadec Islands, and Norfolk Island plants as a single species.

The Norfolk Island plants, *Melicytus ramiflorus* subsp. *oblongifolius*, have seeds 2.3–3 mm long, intermediate between seeds of *M. fasciger* and those of *M. ramiflorus* subsp. *ramiflorus*. Unlike the latter subspecies, *M. ramiflorus* subsp. *oblongifolius* has leaf margins that are only obscurely crenate, rather than toothed. It is also intermediate between *M. fasciger* and *M. ramiflorus* subsp. *ramiflorus* in bracteole position, which varies from midway up the pedicel to immediately subtending the calyx. The endosperm of *M. ramiflorus* subsp. *oblongifolius* is crisp and fills the seed but appears to be less oily than that of *M. ramiflorus* subsp. *ramiflorus*.

Despite the lack of floral differences, the New Zealand, Kermadec Islands, and Norfolk Island plants should not be considered conspecific with those from the other Oceanian islands. The seed and stipule characters are sufficiently distinct and consistent to mark *Melicytus ramiflorus* as a strictly monophyletic taxon, separate from the other two species.

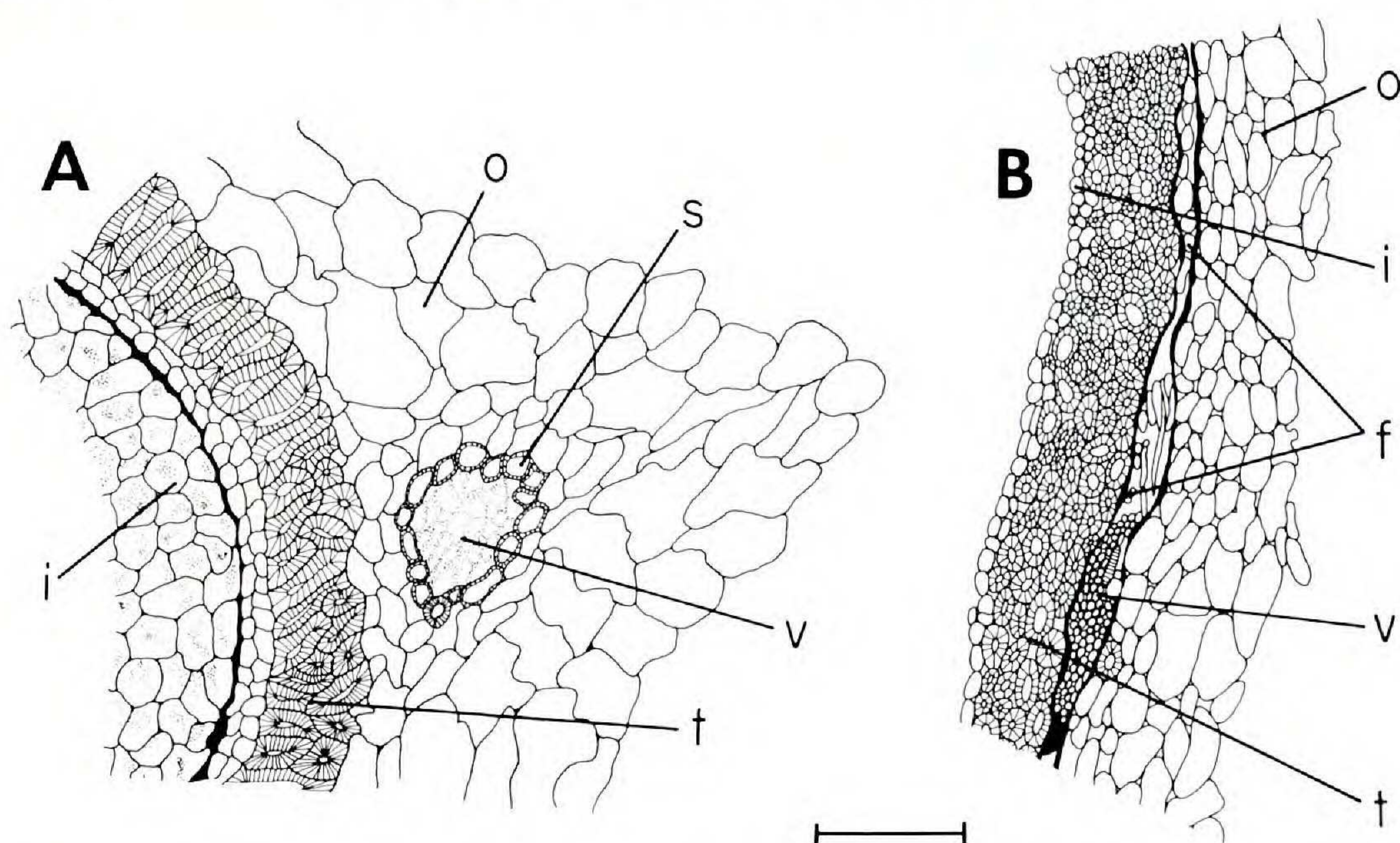


FIGURE 6. Cross sections of testa near chalazal end of seed: A, *Melicytus ramiflorus* subsp. *ramiflorus* (Cooper 121932); B, *M. fasciger* (Bernardi 12944). Camera lucida drawings of paraffin-embedded material stained with safranin and fast green. Key: o = outer layer of thin-walled cells, many highly crushed in B; v = vascular tissue; s = sclerenchymatous sheath; t = inner layer of thick-walled cells; i = innermost layer of thin-walled cells; f = layer of crushed thin-walled cells present only in funicular region of seeds of Oceanian species. Scale = 0.01 mm.

Among the Oceanian plants, the Samoan ones are distinctive in lacking bracteoles on the pedicels and in having pale brown seeds that are over 4 mm long. Although our material is insufficient to allow us to reach firm conclusions, it appears that representatives of *Melicytus* from Tonga are similar and should be included with the Samoan plants. Smith has applied the name *M. samoensis* to these plants.

Melicytus fasciger occurs on Fiji (Viti Levu, Taveuni, and Ngau) and Vanuatu; we have also seen one specimen from the Solomon Islands. These plants are distinguished from *M. ramiflorus* and *M. samoensis* in having brown seeds 3–4 mm long. Within this group of plants, there is a marked discontinuity in petal length of the mature staminate flowers. The average petal lengths in five collections (two from Vanuatu, two from Viti Levu, and one from Taveuni) are 1.4–2.6 mm; in another seven collections (all from Viti Levu), 4.8–6.6 mm. We have seen two collections of flowering pistillate plants, one from Viti Levu and the other from the small island of Ngau. These had average petal lengths of 1.7 and 3.2 mm, respectively. As noted above, in all taxa examined pistillate flowers tended to have shorter petals than did staminate ones. Thus the pistillate plant from Viti Levu could be conspecific with either the long- or the short-petaled staminate forms, whereas the plant from Ngau may be associated with longer-petaled staminate plants. However, we have seen no staminate plants from Ngau. We have seen two fruiting specimens from Fiji—one from Viti Levu, with seeds ca. 3 mm long, and one from Taveuni with seeds up to 3.9

mm. Lack of flowering material from Taveuni prevents connection of these plants with either of the two staminate forms from Viti Levu.

This evidence suggests that there may be two taxa in Fiji and Vanuatu—one relatively long-petaled one that may be endemic to Viti Levu, and a second, more widespread, short-petaled one. Only more collecting will determine whether this is the case or if petal length is simply very variable on Viti Levu. The type specimen of *Melicytus fasciger* (Parks 20645) is a long-petaled staminate plant from Viti Levu. If future workers decide that the short-petaled plants are indeed distinct, a new name will have to be provided.

The four taxa discussed here appear to be unusual within *Melicytus/Hymenanthera* because of their comparatively short, lanceolate to lance-ovate petals that are not at all imbricate at anthesis and their short stamen appendages. We think that they represent a monophyletic unit within the genus. Within this group, *M. ramiflorus* is also a monophyletic taxon based on the uniquely derived character of testa structure. Each of the other two taxa has unique characters, but we have found no character suggesting that *M. fasciger* and *M. samoensis* together constitute a monophyletic unit. This rules out the possibility of recognizing *M. samoensis* as a subspecies of *M. fasciger* to form a taxon distinct from *M. ramiflorus*. If the classification is to reflect the cladistic structure of the group, then *M. fasciger* and *M. samoensis* must be given the same rank as *M. ramiflorus*. Whether this rank should be variety, subspecies, or species is arbitrary. We have chosen the rank of species because the several distinguishing seed characters, although not easily observed, are consistent within geographic units.

TAXONOMIC TREATMENT

KEY TO THE OCEANIAN TAXA OF MELICYTUS

1. Bracteoles at base of pedicel; seeds ≥ 4 mm long; plants of Samoa and Tonga. 3. *M. samoensis*.
1. Bracteoles above base of pedicel; seeds < 4 mm long.
 2. Leaves crenate; seeds 2.5–3 mm long; plants of Norfolk Island. 2b. *M. ramiflorus* subsp. *oblongifolius*.
 2. Leaves dentate; seeds < 2.5 or > 3 mm long.
 3. Stipules stiff-pubescent (except on Kermadec Islands plants); bracteoles near middle of pedicel; seeds black, minutely and sparsely tuberculate, < 2.5 mm long; testa with vascular bundle with sclerenchymatous sheath; plants of New Zealand and Kermadec Islands. 2a. *M. ramiflorus* subsp. *ramiflorus*.
 3. Stipules glabrous; bracteoles variously located; seeds brown, smooth, > 3 mm long; testa without prominent sclerenchymatous vascular bundle; plants of Fiji, Vanuatu, and Solomon Islands. 1. *M. fasciger*.

1. ***Melicytus fasciger*** Gillespie, Bernice P. Bishop Mus. Bull. **91**: 20. fig. 22. 1932.

Melicytus ramiflorus J. R. & G. Forster subsp. *fasciger* (Gillespie) P. Green, Kew Bull. **23**: 345. 1969. TYPE: Viti Levu, Mba, Nandarivatu, May, June, July 1927, Parks 20645 (holotype, BISH; isotypes, P!, SUVA, UC, US).

Shrubs or small trees to 10 m; bark whitish, smooth. Leaves with stipules deltate to lance-linear, 0.5–0.9 mm long, acute at apex, glabrous, caducous; petiole 5–13 mm long, adaxially bicarinate; blade elliptic, ovate, obovate, or oblanceolate, 8.5–17.5 × 3–6.7 cm, membranaceous, apex acuminate, base cuneate, margin serrate to dentate, with dentations 1 to 4 per cm and generally gland tipped. Inflorescences fascicles of 1 to 14 flowers. Pedicel 5–12 mm long in flower, becoming 8–21 mm in fruit; bracteoles variously located on pedicel, from below middle to just beneath calyx, ovate, erose; sepals deltate to ovate, 0.8–1.4 mm long, acute to obtuse at apex, 1-nerved, erose, green; petals lanceolate to lance-ovate, unequal, averaging 1.5–3 or 4.5–7 mm long in staminate flowers and 1.5–3.4 mm in pistillate, often apically thickened, white; anthers nearly sessile, ovate, the connective a short abaxial triangular or ovate flap, $\leq \frac{1}{2}$ length of anther; stigma flaring, crateriform. Fruits subglobose, 4.5–5.5 × 4.5–6 mm, becoming dark at maturity; placentae 3 to 5; seeds 2 per placenta, 3 or 4 developing, 3–3.5 mm long, tan to dark, smooth, with endosperm oily, shrunken in all specimens seen; embryo straight with orbicular cotyledons and straight hypocotyl.

SPECIMENS EXAMINED. **Fiji.** VITI LEVU. Road to Mavai, alt. 2700 ft, *Gibbs 749* (pistillate: BM). Mba, Nandarivatu: valley of Sigatoka, alt. 900 m, *Gillespie 3851* (sterile: BISH, 2 sheets); Mt. Lomalagi, alt. 2700–2900 ft, *Koroiveibau 13946* (short-petaled staminate: BISH, BRI); Mt. Koroyanitu, alt. 3850 ft, *Koroiveibau 14144* (short-petaled staminate: BISH), *Parks 20645* (long-petaled staminate: P); Tavua, upper part of W slopes of Mt. Lomalagi, alt. 950 m, *Stauffer & Koroiveibau 5827* (long-petaled staminate: A, BISH, BRI, K, P); by "Governor's Seat," *Im Thurn s.n.*, 31 Jan. 1906 (short-petaled staminate: K); Tavua, remnant woods on steep slopes at head of Savundamatau Creek, ca. 3 mi W of Nandarivatu, alt. 2900–3000 ft, *Webster & Hildreth 14258* (in fruit: BISH, GH). Mandrongo, Nausori Highlands, rain forest on W slopes of Mt. Mandrongo, alt. ca. 2000 ft, *Webster & Hildreth 14274* (short-petaled staminate: BISH). Mt. Victoria: alt. 800 m, *Lam 6856* (long-petaled staminate: L); lower slopes of mtn., alt. 3000 ft, *Vaughan 3415* (long-petaled staminate: BM). Nandronga and Navosa [formerly Tholo West]: near Koroneyalewa, alt. 1500 ft, on forest ridge, *Parham 1467* (sterile: A); N portion of Rairaimatuku Plateau, between Nandrau and Rewasu, alt. 725–925 m, *Smith 5647* (long-petaled staminate: A, BISH, K, US); alt. ca. 2700 ft, Vaturua, Nandrau, *Ranamu FD 1187* (long-petaled staminate: BISH, BRI). TAVEUNI: vic. of Waiyevo, stream banks, alt. 650 m, *Gillespie 4723* (short-petaled staminate: A, BISH, BRI, GH, US; sterile: K, P); slopes of Mt. Manuka, E of Wairiki, alt. 300–600 m, *Smith 3143* (in fruit: BISH, GH, US). NGAU: hills E of Herald Bay, inland from Sawaieke, alt. 300–450 m, *Smith 7746* (pistillate: BISH, GH, K, P). **Solomon Islands:** Santa Cruz Group, Vanikoro Is., S coast at Emwa, ridge forest, alt. ca. 1500 ft, *Whitmore BSIP 1695* (short-petaled staminate: L). **Vanuatu.** ANEITYUM: in vicinioribus Anawounamalo per semitam ad rivum Inwa Lelgey, alt. 10–180 m, *Bernardi 12944* (K); Anelgauhat Bay, *Kajewski 841* (A, 2 sheets), *Morrison s.n.*, 6 July 1896 (K). ESPIRITU SANTO. Mt. Tabwemasana: alt. 1460 m, *Chew RSNH 217* (K, L), alt. 5800 ft, *Gillison & Beveridge 3516* (K), alt. 1600–1800 m, *McKee 24170* (K); entre les deux sommets, alt. 1800 m, *Raynal RSNH 16342* (K, L, P). TANA: Mt. Tokosh Meru, alt. 600 m, *Kajewski 166* (A).

2a. *Melicytus ramiflorus* J. R. & G. Forster, Char. Gen. Pl. 124. 1776. TYPE: [New Zealand], *Forster 222* (holotype, BM!).

Shrubs or small trees to 4 m; bark smooth, gray, lenticellate. Leaves with stipules broadly asymmetric, triangular, tapering to acuminate point, covered

with stiff erect trichomes, caducous; petiole 11–26 mm long, adaxially bicarinate; blade ovate, oblong, or elliptic, 7–14.4 × 2.6–5.8 cm, membranaceous, apex acute to acuminate (rarely obtuse), base rounded to cuneate, margin dentate, with dentations 1 to 7 per cm and generally gland tipped. Inflorescences fascicles of 1 to 20 flowers. Pedicel 2–6(–16) mm long in flower, becoming 6–11 mm in fruit, puberulent in pistillate flowers, glabrous in staminate; bracteoles usually near midpoint of pedicel, ovate, erose; sepals triangular, 0.6–1.2 mm long, acute to obtuse at apex, 1-nerved, erose, green, puberulent in pistillate flowers, glabrous in staminate; petals ovate to lanceolate, unequal, averaging 1–2.9 mm long in staminate flowers and 0.6–1.1 mm in pistillate, white, apically thickened; anthers nearly sessile, ovate, the connective an abaxial flap, shorter than anther; stigma flaring, crateriform. Fruits subglobose, 3–5 × 3–5.2 mm, blue-violet; placentae 3 (to 5); seeds 2 or 3 per placenta, up to 9 or 10 developing, 1.8–2.4 mm long, dark, lustrous, minutely and sparsely tuberculate, with endosperm oily, filling seed; embryo straight with ovate cotyledons and straight hypocotyl.

SPECIMENS EXAMINED. **New Zealand.** Without further locality, *Anonymous s.n.*, BRI 247133 (BRI), *Banks & Solander s.n.*, 1768–71 (US), *Sind s.n.* (BRI), *Wilkes Expedition s.n.*, 1838–42 (GH). NORTH ISLAND: Woodhill State Forest, ca. 50 km NW of Auckland, alt. 50–100 m, *Bernardi 12366* (US); Waiheke Is. in Hauraki Gulf, S coast at Rocky Bay, *Broek & Broek-Groen 51* (L, 2 sheets); Port Waikato, *Cooper 121932* (A); Swanson Reserve near Auckland, *Davis & Cooper s.n.*, 21 March 1950 (US); Urewera Natl. Park, Gisborne Distr., Aniwanewa, far E side of Lake Waikaremoana, just E of Waipai Swamp, Lake Ruapani track, *Edwards 32* (A); Waitakere Range W of Auckland, S end of Scenic Drive, alt. 300–450 m, *Fosberg 30255* (US); Orakei Basin, Auckland, *Gardner 859* (L); Taranaki, Mt. Egmont, in bush at 3000 ft, *Hunnewell 13534* (GH); Woodcocks N of Auckland, *Hynes s.n.*, 18 Oct. 1958 (US), *Kirk s.n.* (US); Auckland, *Leland et al. 224* (GH, 2 sheets; US); Manukau Co., ca. 10 km E-SE of Clevedon, *Orchard 3282* (A); Whangarei Co., ca. 1½ km SW of Oakura Bay settlement, alt. 60 m, *Orchard 3684* (A); Coromandel Co., ca. 5 km E of Coromandel on road to Te Rerenga, alt. 340 m, *Orchard 3949* (A); Auckland, Purewa Bush, *Powell s.n.*, 29 Nov. 1949 (A); Auckland Prov., Cascade Park, Waitakere range, W-NW of Auckland, *Walker 4246* (US); Wellington Prov., near The Spiral in Natl. Park near Raurimu, *Walker 4315* (US); Wellington Prov., near Waikane, 37 mi N of Wellington, *Walker 5168* (US); Auckland metropolitan area, Mt. Wellington lava fields, *Wright 503* (L); Northland, Mangamuku Gorge, *Zotov 84968* (A). SOUTH ISLAND: Akaroa, *Bellignys s.n.* (GH); Nelson, *Dall s.n.*, 1882 (BRI); Greymouth, *Helms s.n.* (BRI); Westland, Franz Josef Glacier, *Hunnewell 13535* (GH), *Kirk s.n.* (A); Wellington, *Kirk 205* (GH), *Kirk 215* (US); Canterbury, Riccarton Bush, *Lothian s.n.*, Jan. 1937 (GH), *Von Mueller s.n.* (BRI); Canterbury, Pel Forest, *Philipson 10111* (A); Christchurch, Radcliffe Valley, *Stemmer s.n.*, 10 Dec. 1972 (L). KERMADEC ISLANDS. Raoul Is.: Low Flat, *Sykes 643/K* (L); above Low Flat, *Sykes 1084/K* (BRI).

2b. **Melicytus ramiflorus** J. R. & G. Forster subsp. **oblongifolius** (Cunn.) P. Green, J. Arnold Arbor. **51**: 220. 1970. TYPE: Norfolk Island, 1830, *Cunningham 127* (holotype, K!).

Hymenanthera oblongifolia Cunn. London J. Bot. **1**: 124. 1842.

Hymenanthera dentata R. Br. var. *oblongifolia* (Cunn.) Kirk, Trans. & Proc. New Zealand Inst. **28**: 511. 1896.

Shrubs or small trees to 8 m; bark whitish, smooth. Leaves with stipules lanceolate, deltate, or narrowly lanceolate, 0.5–0.8 mm long, acuminate at apex,

hyaline and erose at margin, glabrous, caducous; petiole 10–14 mm, adaxially bicarinate; blade elliptic to ovate, obovate, or oblanceolate, $5.5\text{--}9.5 \times 2.1\text{--}3.7$ cm, membranaceous, apex acute, base cuneate, margin obscurely crenate with gland dots where veins meet margin, 1 to 4 gland dots per cm. Inflorescences fascicles of 1 to 7 flowers. Pedicel 2–7 mm long in flower, becoming 6–11 mm in fruit; bracteoles from near midpoint of pedicel to just beneath calyx, ovate, erose; sepals triangular, 1–1.8 mm long; petals ovate, 1.1–1.2 mm long in staminate flowers (pistillate flowers unknown), thickened on back; anthers nearly sessile, oblong to broadly deltate, the connective an abaxial flap, shorter than anther. Fruits subglobose, $4.2\text{--}4.7 \times 2.8\text{--}3.7$ mm, becoming mauve at maturity; placentae 3; seeds 2 per placenta, 3 to 6 developing, 2.3–3 mm long, pale to dark brown, smooth, with endosperm crisp and watery, filling seed; embryo straight with suborbicular cotyledons; hypocotyl pale greenish.

SPECIMENS EXAMINED. **Norfolk Island:** saddle between Mt. Pitt and Mt. Bates, alt. ca. 800 ft, *Hooglund 11361* (K); Mt. Pitt Reserve, *Lazarides 8073* (L), *Prior s.n.*, 1903 (K); *Ralston s.n.*, July 1969 (K); without further locality, *Backhouse 641* (K), *Cunningham s.n.* (Hb. Brown, K); *Cunningham 44* (K).

3. **Melicytus samoensis** (Christoph.) A. C. Smith, *Allertonia* 1: 370. 1978.

TYPE: Samoa, Savaii, 8 Aug. 1931, *Christophersen & Hume 2315* (holotype, BISH!; isotypes, K!, US).

Melicytus ramiflorus J. R. & G. Forster var. *samoensis* Christoph. Bernice P. Bishop Mus. Bull. 128: 149. fig. 21. 1935.

Melicytus ramiflorus J. R. & G. Forster subsp. *samoensis* (Christoph.) P. Green, Kew Bull. 23: 346. 1969.

Shrubs or small trees to 7 m; bark smooth. Leaves with stipules lanceolate to deltate, 1–1.5 mm long, acute at apex, glabrous, caducous; petiole 8–20 mm, adaxially bicarinate; blade elliptic, ovate, or obovate, the largest $10.5\text{--}18 \times 3.8\text{--}7.5$ cm, membranaceous, apex acuminate, base cuneate, margin crenate to minutely dentate, dentations < 1 to 3 per cm and generally with dark apical gland. Inflorescences fascicles of 1 to 13 flowers. Pedicel 3–9(–12) mm long in flower, becoming 7–12 mm in fruit; bracteoles generally basal, not clearly distinguishable from bracts; sepals deltate to ovate, 0.8–1.2 mm long, acute to obtuse at apex, 1-nerved, erose, green; petals lanceolate, lance-ovate, or ovate, unequal, 1.5–4.5 mm long in staminate flowers, averaging 2.4 mm in single pistillate plant seen, white, thickened apically, spreading at anthesis; anthers nearly sessile, ovate, the connective a short abaxial triangular flap, ca. $\frac{1}{2}$ length of anther; stigma flaring, crateriform. Fruits irregular, $5.5\text{--}8 \times 4.5\text{--}8$ mm, thin walled, smooth; placentae generally 3; seeds 2 per placenta, usually 6 developing, ≥ 4 mm long, tan, smooth, with endosperm shrunken in all specimens seen; embryo straight, with orbicular cotyledons and straight hypocotyl.

SPECIMENS EXAMINED. **Tonga.** EUA: Powell Plantation, *Parks 16006* (BISH, K), *Parks 16307* (BISH), *Sister s.n.*, Dec. 1889 (K); ravine N of Riechelmann's Fuai plantation, near center of island, alt. ca. 120 m, *Yuncker 15349* (BISH, US). **Samoa.** SAVAII: forest above Matavanu crater, alt. ca. 800 m, *Christophersen 651* (BISH, K, P); above Salailua, alt. ± 1450 m, *Christophersen 3094* (BISH); forest at Olo, above Safotu, 700–800 m, *Christophersen & Hume 2315* (BISH, P); Olo, alt. ± 700 m, *Christophersen & Hume 2519* (BISH, K); Aopo-

Gagamalae, alt. 1000–1110 m, *Christophersen & Hume 3437* (BISH, US); Maungalsa, *Vaupel 201* (K, L); in forest W of Mt. Silisili, alt. 1600 m, *Whistler W2523* (BISH); in forest between Mauga Mu and Mauga Afi, alt. 1500 m, *Whistler W2621* (A, BISH, K). UPOLU: E of main road near Tiavi, alt. 700 m, *Whistler W1064* (BISH, US); near Mt. Le Pu'e, alt. 750 m, *Whistler W1189* (BISH, US).

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